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ABSTRACT

Four potential biases incurred by using a sample of wives of male respondents as a sample of women for sex comparisons of the occupational attainment process were examined and empirically assessed. Using data from the Wisconsin longitudinal study of high school seniors, the extent and nature of two potential biases were considered: (1) a sampling bias due to the exclusion of not currently married women, and (2) the bias arising from the omission of data in crucial variables for the sample of wives. Results indicate that the omission of the former appears to have minimal (if any) effect on sex comparisons of occupations attainment, while the absence of the latter (an expanded list of variables for wives) appears to have more deleterious effects on research outcomes. In particular, the lack of availability of measures of socioeconomic index (SEI) of first job for wives affects the sex comparisons. Using the expanded list of variables also indicates differences in the mechanism by which education affects occupational attainment. (MEK)

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RESEARCH NOTE:

How biased are sex comparisons of occupational attainment when wives of male respondents are utilized as the sample of women?

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ABSTRACT

Until recently, research on women's attainments has been extremely limited because, among other things, there was a lack of adequate data. Prior to the availability of the requisite data to study women's attainments, researchers often used extant information on the wives of male respondents in a particular study to inspect women's achievements. In this research note, four potential biases incurred by using a sample of wives of male respondents as a sample of women for sex comparisons of the occupational attainment process are discussed and empirically assessed. The data set is the Wisconsin longitudinal study.

Until the last five years, research on sexual differences in occupational attainment had been extremely limited because, among other things, there was a lack of adequate data on women's attainments. Prior to the availability of the necessary data, researchers often utilized extant information on the wives¹ of male respondents in a particular survey to study women's achievements and sex differences in the achievement process (Featherman and Hauser, 1976; Hauser, Featherman and Hogan, 1977). The researchers themselves are always careful to note the differences between a sample of women and one of wives, as well as the potential biases incurred. However, those who cite this research refer to it as if the studies were about differences between men and women, when, in fact, they are studies of the differences between men and the wives of the male respondents. There are several potential biases that can be incurred by utilizing a sample of wives as a sample of women, if one is interested in ascertaining the differences in the process of occupational attainment for men and women. This research note describes these potential biases and empirically tests whether the biases incurred by using extant data on wives of male respondents for studies of sex differences in occupational attainment are sufficiently serious as to warrant cessation of this practice.

There are four kinds of potential biases that may arise in studies of sex differences of occupational attainment when wives of male respondents are utilized as the sample of women. First, a potential sampling bias may occur because a sample of wives of male respondents omits, by definition, women who are not currently married: women who have never been married or are currently widowed, divorced or separated.

In order to discern whether omitting this group would seriously bias the results, one must consider some of the differences between currently married and not currently married women. Women who are not currently married are more likely to be employed than currently married women. Not currently married women are under much greater economic pressure to be gainfully employed because they are likely to be the major financial supporters of themselves (and their households). Although we know that the greater financial burden of not currently married women results in them having higher employment rates in comparison to currently married women, we cannot predict a priori the sign nor size of the effect of this additional financial burden on their occupational attainments conditional on employment. On the one hand, such financial pressure may force not currently married women to find higher status, better paying jobs; on the other hand, they might be forced to take the first job offered them, rather than wait for a better one, thus reducing their occupational attainments (but see Fligstein and Wolf, 1976 for counter evidence). Furthermore, one cannot predict a priori the direction nor extent of the sampling bias due to the omission of not currently married women because the omitted group is heterogeneous with respect to labor force attachment, career commitment, and restrictions on time and geographic mobility. Never married women are the closest approximation to highly labor force committed, career women since they tend to be employed without interruption, and have no incumbrances on their time or geographic mobility. We would expect this group to have slightly higher mean levels of educational attainment and occupational status attainment, and perhaps higher status "returns" on their educational attainment than do currently married women. On the

other hand, currently widowed, separated or divorced women are likely to have experienced labor force interruptions (due to children) and would have restrictions on their time and geographical mobility due to their offspring. Their process of occupational attainment should be more similar to that of currently married women. Thus, it is difficult to predict what the effect of omitting not currently married women will be since the omitted group is heterogeneous with respect to certain characteristics that might affect occupational attainment. One should also remember that the size of the omitted group is small relative to currently married women. In order for the omitted category to bias the results for the total sample the difference in the process of occupational attainment for the not currently married women must be widely divergent from the results for currently married women.

The second kind of potential bias incurred is another form of sampling bias. Men in the sample for a particular study must meet certain inclusion criteria in order to be included in the sample. These criteria can be, among others, age restrictions or educational requirements. Although the male respondents have to meet these criteria in order to be included in the sample, the only requirement that the wife has to fulfill, is that she be married to a man who meets these requirements. For this reason, the samples of men and the wives of male respondents can be different on important characteristics. For example, if men must be between 25 and 64 in order to be included in the study, technically, the age range of their wives is unbounded. On the average, the wives are more likely to be about two years younger than their husbands. If men have to have been in a certain grade

(i.e., 12th) in a certain year, the educational distribution of the men will be truncated whereas that of the wives of male respondents will not be, unless the variance of their educational distribution is restricted by virtue of assortive mating. Thus, the nature and extent of this second kind of sampling bias depends on the particular inclusion criteria used to define the sample population of men. Since these inclusion criteria differ from study to study, there is no general test for this kind of bias. One can, however, inspect the implications of a set of inclusion criteria for differences on certain characteristics between wives of the male respondents and women in the sample.

The third type of bias arises from the fact that in instances where wives of male respondents are used in the study of sex differences in occupational attainment, the attainments of these wives is not a major focus of the research. Because of this, data on many variables of interest are not obtained for the wives of male respondents. Two omitted variables that are probably important determinants of occupational status are IQ and SEI of first job. The absence of these variables has forced researchers to estimate less complex models of the occupational attainment process for men and wives of male respondents, so as to have comparable measures for each sex. Clearly, the omission of crucial variables can bias the other parameters in the model, thus potentially biasing the sex comparisons (Goldberger, 1973).

The fourth type of potential bias is a reporting bias: men in the sample may erroneously report their spouses' characteristics. This problem is encountered when one is interested in information not only on some relative of the respondent but also on the respondent him(her)self,

In the U.S. Census or Current Population Survey, surrogate reporting is quite common. Since the effects of proxy reporting have been found to be minimal (Bielby, 1976: 114-129), we do not test for these biases in this research note.

DATA, SAMPLE AND VARIABLES

We can assess the extent of the first three kinds of biases by using a data set which has requisite information on men and women in a particular sample, and the wives of male respondents. A data set having such information is the Wisconsin longitudinal study of a random sample of 10,317 persons who were seniors in Wisconsin high schools in 1957 (Sewell and Hauser, 1975). A follow-up study of the members of the sample was executed during 1975, obtaining completed interviews for 9,138 persons (or 88.6 percent of the original sample). One should be careful about generalizing to the entire population, since this sample only includes those who have attended the twelfth grade.

All multiple regression analyses are done separately for men in the cohort, women in the cohort and the wives of male respondents in the cohort. In order to be included in the analyses, individuals had to be working or with a job but not at work at the time of the survey.² (cf. Fligstein and Wolf, 1976 for empirical evidence on whether this sample restriction biases the parameter estimates.) Otherwise, a pair-wise deletion of cases was utilized.

--Table 1 about here--

The variables used in these analyses are drawn from the original 1957 questionnaire, the high school records, the Wisconsin tax data, and the 1975 reinterviews. Certain variables for wives of the male respondents cannot be constructed because the required information was

either 1) obtained prior to the 1975 reinterviews, or 2) not obtained for the spouses in the 1975 schedule. Table 1 describes the measurement of the variables used in these analyses.

RESULTS

--Table 2 about here--

Table 2 presents the means and standard deviations for all variables available for the men in the cohort, women in the cohort and the wives of the male members of the cohort. We can ascertain the effects of the sampling bias by comparing the first and second moments of the distributions of variables available for all three groups. A comparison of the means and standard deviations of the men and the women in the cohort leads one to the same conclusions as a comparison of the men and the wives of male members of the cohort. Men have higher mean levels of educational attainment and occupational status attainment (as well as larger standard deviations) than women or the wives of male respondents. It should be noted that this result (from both comparisons) is in contrast with earlier research which showed that the distributions of men's and working women's (wives') occupational attainments have essentially the same means and standard deviations (Treiman and Terrell, 1975; McClendon, 1976; Featherman and Hauser, 1976). The similarity in the results of the comparisons of the means and standard deviations of men and women and men and wives (for variables available for all three groups) suggests that at least with respect to the first and second moments of the distributions the sampling bias due to omission of not currently married women is minimal.

If one compares the means and standard deviations of the variables which are not available for wives, one obtains a slightly different

picture of sex differences in patterns of mean occupational attainments over the life cycle. Men have lower mean levels of SEI of first occupation than do women, but experience substantial increases in mean occupational attainment over the life cycle (Ornstein and Rossi, 1970; Duncan, Featherman and Duncan, 1972); the mean levels of women's occupational status do not vary from first to current occupation (Wolf, 1975; Rosenfeld, 1976). Thus, although the sampling bias appears to be minimal, the omission of crucial variables for wives leads one to different conclusions about sex differences in mean levels of occupational attainments than can be made from all of the relevant variables.

Before considering how the potential biases affect the parameter estimates, we would like to illustrate how the second potential type of sampling bias can affect the distributions on basic demographic variables. In the Wisconsin study, male and female members of the cohort had to be high school seniors (in a Wisconsin high school) in order to be included in the sample. Thus, although their educational distribution is truncated (i.e., no one has less than eleven years of completed schooling), that of the wives of male respondents is not. Despite the fact that the first and second moments of the educational distributions of women and wives of male respondents are essentially the same (see Table 2), the educational distributions themselves are quite different. First, 7.25 percent of the wives have less than twelve years of schooling. A χ^2 test of independence on these two distributions using the following categories (12, 13-15, 16, 17+) indicates that we cannot accept the null hypothesis that the two distributions are the same. Similarly, the age distributions of women in the sample and the wives of male members of the sample are quite dissimilar. Ninety-eight percent of the

women in the sample are between the ages of 34 and 37 in 1975. Only 46.1 percent of the wives of the male respondents were in this age range; 48.5 percent of the wives were younger than age 34. Quite obviously, the second type of sampling biases markedly increases the differences on basic demographic characteristics between wives and women and wives and men.

--Table 3 about here--

Table 3 presents comparisons of the occupational attainment process of men, women and wives of male respondents using as exogenous variables only those variables which are available for all three groups and measured in an exactly comparable fashion. This table allows us to assess the effects of the sampling bias on the parameter estimates. Inspecting the parameter estimates for the effects of education, we find that the occupational status "returns" to education in these less complex models are essentially the same for women and wives. Although the patterns of statistically significant effects are quite different for women and wives, an inspection of the size of these parameters indicates that the effects which are statistically significant in one group and not in the other are, in general, trivial. For example, father's occupational status has a statistically significant effect on wife's occupational attainment, but the size of the effect is such that a ten point increment in FASEI results in a .62 increase in daughter's current occupational status. Despite the differences in statistical significance, the effects of father's occupational status, number of siblings, father's education and farm origin are substantively very similar for women and wives. Although the effect of being raised in a broken family is not trivial for the women in the sample, this effect does

not differ in a statistically significant way (using a Z test) from the coefficient for wives. Thus, the differences in the parameter estimates in this restricted equation for women and wives are minimal, suggesting that the potential sampling bias has only minor effects on the sex comparisons of occupational status attainment.

--Table 4 about here--

Table 4 presents multiple regression analyses predicting the occupational status of first and current job using an expanded set of variables for men and women, and the less elaborate equation predicting current occupational status for wives. If the conclusions one reaches about sexual differences in occupational attainment from the expanded set of equations in Table 4 are different from those obtained from the less complicated equation found in Table 3, then the bias due to the omission of crucial variables is serious. Inspection of Table 4 does indicate that the bias due to omitted variables is not trivial. The sex comparisons using the less elaborate equation found in Table 3 (which includes in the sex comparisons only those variables which are available for wives) indicate that the process of occupational attainment is very similar for men and women and men and wives of male respondents, since the occupational status "returns" to education are essentially the same and the differences in the size of the effects of the other variables are minimal. Table 4 gives a very different picture of the sexual differences in the process of occupational attainment. Some of the additional variables, mother's education, mother's employment, parental income, IQ, high school rank, and vocational training, do not have markedly different effects on the occupational status of first or current job for males and females. However, the inclusion of SEI of first occupation in the set of equations helps us understand the different

mechanisms by which education affects occupational attainment. Comparing the equations predicting SEI of first occupation for men and women, we find that men get twice as much return to their educational attainment as do women in terms of placement in first job (6,526 versus 3,647). An inspection of the expanded equation predicting current occupational status indicates that women get slightly less returns on their early occupational experience (.335 versus .380) but get higher net returns on their educational attainment at later points in the life cycle (2.198 versus 1.136). Despite the fact that the total effects of education are nearly identical for each sex (3.616 for males and 3.420 for females) the process by which education affects SEI of current job is quite different for each sex. Women are clearly disadvantaged in terms of initial job placement. Subsequently, perhaps because they are in some sense constantly reapplying for entrance to the labor market (after interruptions), they must continue to rely on their educational experience. On the other hand, men who are likely to have fairly continuous work histories rely quite heavily on their early occupational experience for their occupational advancement. The omission of certain variables for wives (in particular SEI of first job) forces researchers to make sex comparisons of occupational attainment using less elaborate models. These sex comparisons using less complex models can be misleading. When SEI of first job is included in the equation predicting current occupational attainment, one reaches quite different conclusions about sex differences in the occupational attainment process.

These empirical analyses suggest that the bias due to the first kind of sampling bias (the omission of not currently married women) is minimal but that the bias due to the omission of crucial variables is more serious. In an attempt to understand why omitting not currently

married women did not bias the parameter estimates, we estimated the equations found in Table 4 for two groups of female members of the cohort: currently married women and not currently married women. Not currently married women had higher mean levels of education, SEI of first occupation and SEI of current occupation than did currently married women. An analysis of covariance test of differences in slope vectors indicated that the overall process³ of occupational attainment for currently married women is not statistically significantly different than the process for not currently married women, despite the fact that the test for differences in intercepts is statistically significant. Thus, one probable reason for a lack of empirical evidence for the first kind of sampling bias is that the occupational attainment processes of currently married and not currently married women are not markedly divergent, despite differences in levels.

CONCLUSIONS

This research note has described certain potential biases incurred by using data on wives of male respondents for sex comparisons of the occupational attainment process. We tested empirically the extent and nature of two kinds of potential biases: 1) a sampling bias due to the exclusion of not currently married women, and 2) the bias arising from the omission of data in crucial variables for the sample of wives. The sampling bias due to omission of not currently married women appears to have minimal effects (if any) on sex comparisons in occupational attainment. There are two probable reasons for a lack of a sampling bias. First, the omitted group (not currently married women) is somewhat heterogeneous with respect to the occupational attainment process. Second, since the omitted category is quite small relative to all women

(21.2 percent in these data), it would require quite marked differences in the processes of occupational attainment between not currently married women and currently married women for a sample of wives to be a biased sample of women. The conclusions one makes about sex differences in occupational attainment using a restricted group of variables available for wives as well as men are quite different from those one would make using an expanded set of variables, which are only likely to be available for a sample of women. In particular, the lack of availability of measures of SEI of first job for wives affects the sex comparisons. When using the truncated list of variables available for wives, one is only able to compare the total effects of education. Using the expanded list of variables indicates differences in the mechanism by which education affects occupational placement. If one is interested in obtaining a complete picture of sex differences in occupational attainment over the life cycle, one is advised to use samples of women with a more complete roster of information rather than wives of male respondents, for whom data on crucial variables is most often missing. However, if one has a complete roster of variables for the wives of male respondents, it appears that omitting the minor proportion of women who are not currently married will not bias the parameter estimates.

TABLE 1: Measures of Variables Used in the Analyses

- FASEI - Father's Occupation--when individual was a high school senior^{*}
scaled in Duncan SEI units, from the 1975 survey.
- INTACT - Intact Family--respondent lived with both parents most of the time
until respondent was senior in high school^{*} from
1975 questionnaire.
- NOSIBS - Siblings--number of individuals siblings in family of origin,
from 1975 questionnaire.
- FAED - Father's Education--number of years of formal schooling completed,
from 1975 questionnaire.
- FARMOR - Rural Origin--whether individual's father had a farming occupation
when individual was senior in high school^{*} from 1975
questionnaire.
- EDUC - Education--number of formal years of schooling completed, from
1975 questionnaire.
- MAED - Mother's Education--number of years of schooling completed by mother,
^{**}from 1975 questionnaire, missing data filled
in from earlier surveys.
- MAWORK - Mother's Employment--^{**}mother employed when respondent was a high
school senior, from 1975 questionnaire.
- PARINC - Parental Income--^{**}averaged over the years 1957-1960, scaled in \$100
and truncated at \$50,000, from Wisconsin tax data.
- IQSCOR - Measured Intelligence--^{**}respondent's IQ based on Henmon-Nelson
test scores administered when respondent
was in 11th grade.
- HGHRANK - Rank in high school class--^{**}based on grades in high school, converted
to ranks and normalized, from school
records.
- VOTECH - Vocational Training--^{**}whether the respondent was ever in a
training program.
- FIRST - First Occupation--^{**}respondent's first occupation after completion
of schooling, scored in Duncan SEI units, from
1975 survey.
- CURRENT - Current Occupation--individual's occupation in 1975 scored in
Duncan SEI units, from 1975 survey.

* If the time reference for respondents is "senior in high school," the
appropriate time reference for wives is "when you were 16 years old."

** These measures are not available for wives of male respondents.

TABLE 2: Means and Standard Deviations for the Men in the Sample, the Women in the Sample and the Wives of Men in the Sample on all Relevant Variables

	Men in the sample		Women in the sample		Wives of Men in the sample	
	X	SD	X	SD	X	SD
FASEI	34.73	22.87	33.78	22.35	34.14	22.35
INTACT	.91	.29	.90	.31	.91	.29
NOSIBS	3.19	2.55	3.31	2.65	3.21	2.62
FAED	9.82	3.49	9.62	3.32	10.40	3.41
FARMOR	.32	1.05	.35	1.10	.21	.41
EDUC	13.91	2.66	13.11	1.97	12.94	1.98
MAED	10.56	2.82	10.36	2.80	---	---
MAWORK	.35	.48	.39	.49	---	---
PARINC	66.92	57.06	62.46	48.67	---	---
IQSCOR	101.22	14.90	101.31	14.40	---	---
HGHRANK	97.64	14.02	104.34	13.97	---	---
VOTECH	.41	1.66	.56	1.89	---	---
FIRST	39.80	26.49	45.88	18.65	---	---
CURRENT	49.52	23.54	45.52	20.31	44.93	20.23
N	3690		2054		1272	

TABLE 3: Regression Analyses Predicting Occupational Attainment for Men in the Sample, Women in the Sample and Wives of Men in the Sample including Variables that are Exactly Comparable for all Three Groups.

Predetermined variables	Metric Coefficients (Standard Errors)		
	Men in the sample	Women in the sample	Wives of Men in the Sample
FASEI	.155* (.018)	-.008 (.024)	.062* (.029)
INTACT	.013 (1.144)	3.288* (1.351)	.817 (1.763)
NOS18S	-.165 (.124)	-.471* (.152)	-.706* (.200)
FAED	.175 (.107)	.335* (.141)	.045 (.177)
FARMOR	.179 (.360)	-1.025* (.430)	1.251 (1.412)
EDUC	4.466* (.124)	4.354* (.210)	4.530* (.278)
Constant	-19.26	-15.54	-15.04
R ²	.339	.220	.244

*Significantly different from zero at the .05 level.

TABLE 4: Regression Analyses Predicting Occupational Attainment for the Men in the Sample, Women in the Sample and Wives of Men in the Sample, using all Relevant Variables, Regardless of Availability for Wives [Unstandardized Coefficients (standard errors)]

Predetermined variables	Men in Sample		Women in Sample		Wives
	First	Current	First	Current	Current
FASEI	.131* (.018)	.095* (.019)	.079 (.022)	-.016 (.023)	.062* (.029)
INTACT	-.974 (1.088)	.043 (1.115)	3.314* (1.248)	1.715 (1.320)	.817 (1.763)
NOSIBS	-.313* (.117)	.090 (.120)	-.466* (.140)	-.135 (.148)	-.706* (.200)
FAED	.066 (.107)	.052 (.110)	.031 (.136)	.190 (.143)	.045 (.177)
FARMOR	.265 (.344)	.004 (.353)	.183 (.398)	-1.074 (.421)	1.251 (1.412)
EDUC	6.526* (.139)	1.136* (.180)	3.647* (.211)	2.198* (.238)	4.530* (.278)
MAED	-.041 (.119)	.142 (.122)	.115 (.146)	.076 (.154)	
MAWORK	1.467* (.623)	.815 (.639)	.431 (.742)	-.052 (.784)	
PARINC	-.001 (.005)	.003 (.006)	.018* (.008)	-.003 (.009)	
IQSCOR	.090* (.025)	.186* (.025)	.081* (.032)	.165* (.034)	
HGHRANK	.109* (.027)	.064* (.028)	.222* (.034)	.144* (.036)	
VOTECH	-.119 (.176)	.140 (.180)	-1.299* (.190)	.237 (.203)	
FIRST		.380* (.017)		.335* (.023)	
Constant	-74.07	-12.71	-37.54	-31.53	-15.04
R ²	.579	.441	.299	.342	.244

*Significantly different from zero at .05 level.

Footnotes

¹ Clearly when researchers study marriage mobility they restrict their sample to wives. We shall not discuss this in this research note.

² The time reference for the male and female members of the cohort was the survey week. The time reference for spouses is a bit more general. The question was "What does your (husband/wife) do?" This question seems to be ascertaining the spouses' usual activity rather than the actual activity last week. These differential time references seem to have minimal effects on the results except that more spouses may be classified as labor force active than would be so classified if the other time reference were used.

³ It should be remembered that this is a general test for differences in slope vectors. Despite the fact that the overall test indicates no difference in the processes, some variables of interest have differential effects in the two groups.

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